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A NEW ILLUSION FOR TOUCH AND AN EXPLANATION FOR THE ILLUSION OF DISPLACEMENT OF CERTAIN CROSS LINES IN VISION.

By F. B. DRESSLAR.

I recently had occasion to test the experiment described by Loeb¹ with reference to the illusion which arises in touch, when two edges are placed so as to cross each other on a level, at a moderately small angle, and the finger tip be passed along one edge and over the junction point. The illusion which he noticed is to the effect that the segments of the line along which his finger moves, appear to be raised up where they meet the diagonal line, something like the rafters to the centre pole of a roof. As he remarks, the illusion is only present when some little pressure is exerted on the edge by the finger, and not when it is run along the edge lightly.

According to the author the illusion arises from the fact that as the finger approaches the junction point, instead of all the pressure being exerted on the one edge, it is exerted on two, and in this way the finger is slightly raised, and is kept so until the junction point is passed, when it begins to sink and so gives a basis for the illusion.

There is another illusion connected with this experiment which, so far as I know, has not yet been described. Although it is quite distinct in using two edges, as Loeb did, it can be more easily shown by pricking pin holes through a card along two lines crossing in the same way as the two edges described. In Figure 1, let A D and B C represent two lines of pin holes on the roughened side, crossing at O. If the finger tip be passed along B C, toward C, when it crosses the junction of the two lines at O, A D will seem not to be a straight line, but a broken one, and the section O D will seem to be displaced and to occupy the position o' d'. Likewise if the finger passes along A D, toward D, the line B C will appear broken, and the part O C will take a corresponding displacement. The illusion is quite striking, and the following explanation is offered:

The finger, as it passes along the edge followed, touches the part of the diagonal line, making the acute angle much sooner than the other part, because the finger tip extends for some distance beyond the sides of the edge it follows, and since the ability of the finger tip to distinguish two points as separate requires a separation of these points from 2 to 4 mm., the sensation from the first one touched will have disappeared as a distinct sensation before the sensation of the other as distinct is given. And thus, from the basis of the sensation received, an apparent displacement of the line must needs follow. This view is strengthened by the fact that the illusion does not appear if the cross line is approached at a right angle. Neither does the displacement appear if a portion of the finger tip be pressed through a small hole in a

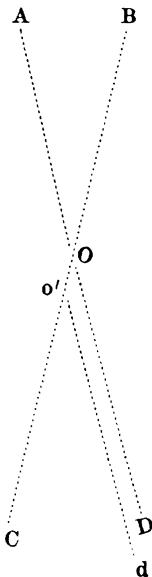


FIG. 1.

¹ Pflüger's Archiv., Vol. 46, p. 33.

card, and so fastened that only a small portion of the sensitive surface of the finger be allowed to touch the edge followed.

Since a similar illusion appears for the eye, it has occurred to me that the same explanation given for the illusion of touch would answer for the illusion in vision if the fovea of the eye be considered as receiving the stimulus in the same way, or at least in a way comparable to that of the finger tip.

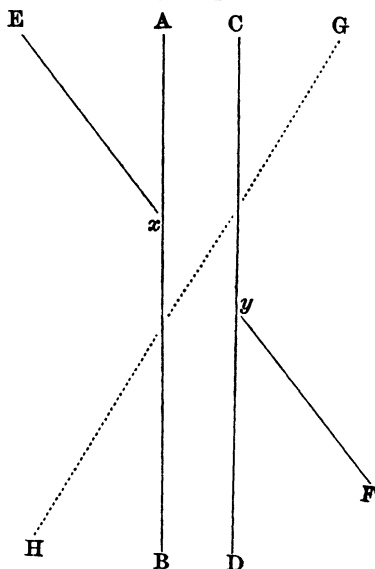


FIG. 2.

If, in Figure 2, the eyes follow the line A B, from A toward B, the point x will enter the field of clearest vision sooner than point y , and as the eye must move down some little distance before it gets the clearest view of y , the tendency is to make the displacement appear in the line, as if the point x had been met with in the same line (C D) as y , but as much higher as the difference in time of receiving the impression would indicate. The illusion still appears if the lines A B and C D be removed, but all other conditions remain unchanged.

The following observations are in harmony with this explanation:

1. The illusion is more marked when the eyes move along the line A B (Figure 2), from A toward B, than from B toward A; while in following with the eye the line C D, the illusion is greater in passing from D toward C than contrariwise.
2. The illusion disappears if the cross line be approached along the dotted line G H.
3. The illusion also disappears if the eyes be directed immediately to the point in the centre of the space between the perpendiculars which the cross line, if completed, would cut.
4. The illusion diminishes as we pass from the most sensitive part of the retina, and, when the light is sufficiently strong, in the outer part of the retina, it is wholly lost, whether the eye be in motion or at rest.

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